

## CLAIMS

1. A method for diagnostic multicast crossbar switching in an integrated circuit (IC) digital communication relay device, the  
5 method comprising:

establishing a first and second input path to receive communications;

establishing a first and second output path to supply communications;

10 selectively passing communications from the first input to the first and second outputs;

selectively passing communications from the second input to the first and second outputs;

selectively decoding received communications; and

15 selectively encoding supplied communications.

2. The method of claim 1 further comprising:

in a first mode of operation, decoding communications received at the first input, and supplying the decoded communications at  
20 the first output; and

encoding communications received at the second input and supplying the encoded communications at the second output.

3. The method of claim 1 further comprising:

25 in a second mode of operation, passing communications received at the first input to the first output; and

passing communications received at the second input to the second output.

4. The method of claim 1 further comprising:  
5       in a third mode of operation, passing communications received at the first input to the second output; and  
            passing communications received at the second input to the first output.

- 10       5. The method of claim 1 further comprising:  
            in a fourth mode of operation, passing communications received at the first input to the second output and to the first output.

- 15       6. The method of claim 1 further comprising:  
            in a fifth mode of operation, passing communications received at the second input to the second output and to the first output.

- 20       7. The method of claim 1 further comprising:  
            in a sixth mode of operation, decoding communications received at the first input;  
                encoding the decoded communications; and  
                supplying the encoded communications at the second output.

- 25       8. The method of claim 1 further comprising:  
            in a seventh mode of operation, decoding communications received at the second input;

encoding the decoded communications; and  
supplying the encoded communications at the first output.

5           9.       The method of claim 1 further comprising:  
in an eighth mode of operation, decoding communications  
received at the first input;

encoding the decoded communications; and  
supplying the encoded communications at the first output.

10          10.      The method of claim 1 further comprising:  
in a ninth mode of operation, decoding communications  
received at the second input;  
encoding the decoded communications; and  
supplying the encoded communications at the second output.

15          11.      The method of claim 1 further comprising:  
in a tenth mode of operation, encoding communications  
received at the first input;  
decoding the encoded communications; and  
supplying the decoded communications at the first output.

20          12.      The method of claim 1 further comprising:  
in an eleventh mode of operation, encoding communications  
received at the second input;  
decoding the encoded communications; and  
supplying the decoded communications at the second output.

13. The method of claim 1 further comprising:

In a twelfth mode of operation, decoding communications received at the first input;

5 supplying decoded communications at the second output; encoding the decoded communications; and supplying the encoded communications at the first output.

14. The method of claim 1 further comprising:

10 In a thirteenth mode of operation, encoding communications received at the first input;

supplying encoded communications at the second output; decoding the encoded communications; and supplying the decoded communications at the first output.

15 15. A method for diagnostic multicast crossbar switching

in an integrated circuit (IC) digital communication relay device, the method comprising:

receiving a first communication from a first node;

20 selectively decoding the first communication and supplying it to a second node;

selectively passing the first communication to the second node;

selectively passing the first communication to the first node;

25 and

selectively decoding the first communication, encoding the first communication, and supplying the first communication to the first node.

- 5           16. The method of claim 15 further comprising:  
receiving a second communication from the second node;  
selectively encoding the second communication and  
supplying it to the first node;  
selectively passing the second communication to the first  
10       node;  
selectively passing the second communication to the second  
node; and  
selectively encoding the second communication, decoding the  
second communication, and supplying the second communication to the  
15       second node.

17. The method of claim 16 in which the device includes  
an encoder and a decoder having inputs and outputs, in which the first  
node has input and output ports, and in which the second node has input  
20       and output ports; and  
wherein selectively decoding the first communication and  
supplying it to a second node includes connecting the first node output  
port to the decoder input and connecting the decoder output to the second  
node input port.

18. The method of claim 17 wherein selectively passing the first communication to the second node includes connecting the first node output port to the second node input port.

5 19. The method of claim 18 wherein selectively passing the first communication to the first node includes connecting the first node output port to the first node input port.

10 20. The method of claim 19 wherein selectively decoding the first communication, encoding the first communication, and supplying the first communication to the first node includes connecting the first node output port to the decoder input, connecting the decoder output to the encoder input, and connecting the encoder output to the first node input port.

15 21. The method of claim 20 wherein selectively encoding the second communication and supplying it to the first node includes connecting the second node output port to the encoder input and connecting the encoder output to the first node input port.

20 22. The method of claim 21 wherein selectively passing the second communication to the first node includes connecting the second node output port to the first node input port.

23. The method of claim 22 wherein selectively passing the second communication to the second node includes connecting the second node output port to the second node input port.

5           24. The method of claim 23 wherein selectively encoding the second communication, decoding the second communication, and supplying the second communication to the second node includes connecting the second node output port to the encoder input, connecting the encoder output to the decoder input, and connecting the decoder  
10          output to the second node input port.

25. An integrated circuit (IC) digital communications relay device for diagnostic multicast crossbar switching, the device comprising:  
15          a first input port;  
              a first output port;  
              a second input port;  
              a second output port;  
              a decoder having an input to accept communications, the decoder having an output to supply decoded and corrected  
20          communications;  
              an encoder having an input, the encoder having an output to supply communications encoded with forward error correction (FEC); and  
              a switch system having an input to accept switching commands for selectively connecting the input ports, output ports,  
25          decoder, and encoder.

26. The device of claim 25 wherein the switch system accepts a first mode command and in response:

connects the first input port to the decoder input and the decoder output to the first output port; and

5 connects the second input port to the encoder input and the encoder output to the second output port.

27. The device of claim 25 wherein the switch system accepts a second mode command and in response:

10 connects the first input port to the first output port; and connects the second input port to the second output port.

28. The device of claim 25 wherein the switch system accepts a third mode command and in response:

15 connects the first input port to the second output port; and connects the second input port to the first output port.

29. The device of claim 25 wherein the switch system accepts a fourth mode command and in response:

20 connects the first input port to the second output port and to the first output port.

30. The device of claim 25 wherein the switch system accepts a fifth mode command and in response:

25 connects the second input port to the second output port and to the first output port.

31. The device of claim 25 wherein the switch system accepts a sixth mode command and in response:

- 5 connects the first input port to the decoder input;  
connects the decoder output to the encoder input; and  
connects the encoder output to the second output port.

32. The device of claim 25 wherein the switch system accepts a seventh mode command and in response:

- 10 connects the second input port to the decoder input;  
connects the decoder output to the encoder input; and  
connects the encoder output to the first output port.

33. The device of claim 25 wherein the switch system  
15 accepts an eighth mode command and in response:

- connects the first input port to the decoder input;  
connects the decoder output to the encoder input; and  
connects the encoder output to the first output port.

20 34. The device of claim 25 wherein the switch system  
accepts a ninth mode command and in response:

- connects the second input port to the decoder input;  
connects the decoder output to the encoder input; and  
connects the encoder output to the second output port.

35. The device of claim 25 wherein the switch system accepts a tenth mode command and in response:

connects the first input port to the encoder input;  
connects the encoder output to the decoder input; and  
connects the decoder output to the first output port.

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36. The device of claim 25 wherein the switch system accepts an eleventh mode command and in response:

connects the second input port to the encoder input;  
connects the encoder output to the decoder input; and  
connects the decoder output to the second output port.

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37. The device of claim 25 wherein the switch system accepts an twelfth mode command and in response:

15

connects the first input port to the decoder input;  
connects the decoder output to the encoder input and to the second output port; and  
connects the encoder output to the first output port.

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38. The device of claim 25 wherein the switch system accepts an thirteenth mode command and in response:

25

connects the first input port to the encoder input;  
connects the encoder output to the decoder input and to the second output port; and  
connects the decoder output to the first output port.